

Research Note 86-40

AD-A167 876

DOING BUSINESS WITH WORDS
PERFORMATIVE ASPECTS OF DEONTIC SYSTEMS

Ronald K. Stamper
London School of Economics

and

Ronald M. Lee
University of Texas at Austin

for

ARI Scientific Coordination Office, London

Michael Kaplan, Chief

BASIC RESEARCH
Milton S. Katz, Director

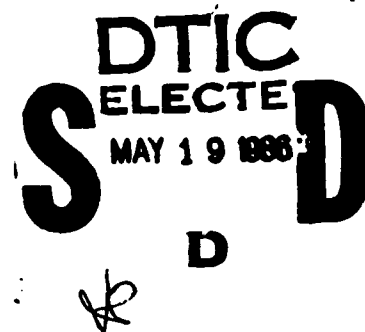


U. S. Army

Research Institute for the Behavioral and Social Sciences

April 1986

Approved for public release; distribution unlimited.



DTIC FILE COPY

86 5 16 077

U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the
Deputy Chief of Staff for Personnel

EDGAR M. JOHNSON
Technical Director

WM. DARRYL HENDERSON
COL, IN
Commanding

Research accomplished under contract for
the Department of the Army

London School of Economics

Technical review by

Steve Kronheim

This report, as submitted by the contractor, has been cleared for release to Defense Technical Information Center (DTIC) to comply with regulatory requirements. It has been given no primary distribution other than to DTIC and will be available only through DTIC or other reference services such as the National Technical Information Service (NTIS). The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ARI Research Note 86-40	2. GOVT ACCESSION NO. ADA167 876	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Doing Business with Words Performative Aspects of Deontic Systems		5. TYPE OF REPORT & PERIOD COVERED Nov 85 - Apr 86 Final Report
		6. PERFORMING ORG. REPORT NUMBER L77
7. AUTHOR(s) Ronald K Stamper Ronald M Lee (University of Texas)		8. CONTRACT OR GRANT NUMBER(s) DAJA45-84-M-0277
9. PERFORMING ORGANIZATION NAME AND ADDRESS London School of Economics Houghton Street London WC2A 2AE		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2Q161102B74F
11. CONTROLLING OFFICE NAME AND ADDRESS U S Army Research Institute for the Behavioral and Social Sciences; 5001 Eisenhower Ave.; Alexandria, VA. 22333-5600		12. REPORT DATE April 1986
		13. NUMBER OF PAGES 67
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) European Science Coordination Office, Army Research Institute; Box 65; F.P.O. New York 09510-1500		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Michael Kaplan, Contracting Officer's Representative. (A modified version of this paper will appear in <u>Knowledge Representation and Organisational Theory</u> , edited by Ronald Lee and Patrick Humphreys)		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) speech act, communication; decision support, norm, computer, rule, business, deontic system, performatives, contract, authorisation documents, economic governance, markets, bureaucracy, markets, organisational knowledge. -		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The data-processing approach to business applications of computers is being displaced by an IKBS paradigm. It is argued that an even better approach will account for the ways in which the reality of business is actually created by the information system. This new view arises from the study of decision support systems and among its key concepts are performatives and deontic structures. Deontic systems are systems of obligations such as one finds in social		

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ARI Research Note 86-40 (20. Continued)

systems in general and business systems in particular. Performatives are ways of signifying changes that people want to make in the deontic structure. In business, very often there are special documents to function as performatives.

The mechanical transmission of signals from one machine to another is quite different from the communication of intentions that takes place between persons. A communication act consists of a meaningful utterance (an illocution) and an intention to change the obligations or expectations of others (a performative). These concepts are introduced in the context of an examination of the governance of economic transactions among organizations. Of special practical use is the possibility of using rules to represent organizational knowledge quite independently of the application programs that normally, today, contain a confusing mixture of computational and business factors.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DOING BUSINESS WITH WORDS:
PERFORMATIVE ASPECTS OF DEONTIC SYSTEMS

Ronald Stamper
London School of Economics

Ronald M. Lee
University of Texas in Austin

The thesis of this paper is that business is essentially done through the use of words. The words we use in our business communications have a simple standard structure of which the performative part is the signal for some specific business action. The action performed in nearly all cases makes no physical difference to the world but it does change the social world, a world of interlocking obligations. That is where the term 'deontic' comes in; a deontic system is a system of obligations. We shall make a preliminary study of how performatives alter deontic structures.

Three Paradigms

Three radically different paradigms can inform the thinking of the analyst-designer working on the application of computers to organisational tasks. One is long established among the traditional data-processing community. The second is the height of fashion among the new IKBS fraternity. The third, about which we shall write, is emerging from the thinking among the scientists working on decision support systems.

or	
21	<input checked="" type="checkbox"/>
d	<input type="checkbox"/>
	<input type="checkbox"/>
ity Codes	
Dist	Avail and/or Special
A-1	

A paradigm is broader than a theory; it is a way of thinking. A paradigm may not have evolved one unifying scientific theory but it may incorporate several conflicting theories, as economics does today. Sometimes all the workers in a field subscribe to a single unifying theory and their energies are devoted to applying the theory and resolving some well defined residual problems. A paradigm also incorporates a host of assumptions that are seldom articulated and discussed explicitly (as theories are), but without these assumptions the theories would not stand up. Generally a paradigm has a long tradition which transmits, from one generation of thinkers to the next, sets of values about what is relevant to the field of enquiry, what constitutes a satisfactory resolution of a problem, what methods of enquiry are acceptable, and so forth. (See Kuhn 1962.) A paradigm helps one to think within the field but it tends also to confine its adherents in mental straitjackets.

To shift from one paradigm to another cannot be done rationally; emotions are involved. Deductive reasoning about a class of problems works when the participants in the discussion share the same world-view. However, when someone raises the unspoken assumptions behind the theory (the irrational part of the paradigm), a very different kind of discussion ensues. This chapter introduces a new paradigm which has been emerging from the work being done on decision support systems.

The DP Paradigm

When computers were first put to use in business and administration, they were seen as devices to automate the work that we were accustomed to do with pen and paper. By encoding words and numbers mechanically as holes in cards or magnetic signals, we could compare, sort, and do arithmetic very efficiently. This helped us to reduce the costs of our bureaucratic activities.

To analyse and design systems for this purpose, we had only to observe what documents or other forms of messages had to be transmitted or held in files, what numbers or words within them had to be transcribed onto other documents with or without rearrangement or arithmetical operations being carried out. From a strict theoretical point of view, it was not necessary to know the meanings of the records, messages, data items or the operations upon them. Of course, it helped one to understand a system described in this way to talk of "stock requisition" instead of "message type 123" and to refer to the "quantity required" rather than to "field no.4". An adequate theory of data-processing need only account for a world comprising locations between which messages would be transmitted, the messages themselves and their constituent parts, and a repertoire of operations on numbers and character strings. Notice what a simple world this is, how limited is its ontology, its inherent assumptions about what exists in the world of data-processing. To understand a paradigm, it is usually helpful to check whether

it imposes some ontological assumptions that force one to think of the world in a limited way. The traditional world of DP is limited indeed.

The standard systems analysis methodologies embody the DP paradigm. (See the works of De Marco and of Lundeberg, for example.)

The IKBS Paradigm

Several ideas led to a shift in favour of another paradigm. One idea is that much of the data in an organisation could be shared by all users. This led to the separation of file-handling from the processing of the data; by itself this does not take our thinking outside the DP paradigm - it is just like adopting the ancient concept of a central registry for files that have to be booked out to each user in turn. The next step was the search for a way of organising the data to suit all the different users; the database management system was the result. The natural way to organise the data was to regard the database as a model of the real world and to structure its contents in line with our intuitions about the structure of the world. At the same time our ideas about programming had changed: functional or declarative programs could be written to state what the processes should accomplish without specifying the sequence of operations to be employed. Once again, it was helpful in programming this way to think in terms of the real world and constraints that

would have to be obeyed by our representations of it. The new paradigm of intelligent knowledge bases had evolved.

The IKBS paradigm goes far beyond the DP paradigm in acknowledging explicitly some of the assumptions that we have tended to make without really admitting it. Whereas the DP practitioner is concerned explicitly with manipulating records containing strings of symbols, but implicitly with modelling an objective reality, we find that the IKBS practitioner makes explicit ontological assumptions about a world beyond the messages. There has to be a semantic theory to account for the relationships between the messages and what they stand for. Logic programming typifies this advance. (See Lee and Stamper 1985.) It deals with a universe of discourse, that is, a collection of discrete and identifiable individuals about which propositions can be asserted. Properties and relationships are represented using one-place and many-place predicates. These can represent the real world with which the people in the organisation deal in their messages and records. In this new IKBS paradigm we have employed the concept of an objective world, independent of the many people in the organisation, represented as a consistent body of knowledge which everyone can share.

The Need for a New Paradigm

The IKBS paradigm has been adopted as the basis of huge programmes of investment in Japan, Europe, the USA and the UK. It has hardly begun to displace the traditional DP paradigm in

everyday computer applications. There are good reasons to suggest that it should not be allowed to do so, because its own unstated assumptions about the world beg too many questions about the nature of organisational behaviour. Work in the realm of decision support systems suggests that a further paradigm shift is required. (See Methlie and Sprague 1985.)

Actual business decisions are not made by manipulating the contents of some agreed body of knowledge according to established objective functions. That only happens in the realm of applied mathematics. The techniques of formal, logical and mathematical models do become useful once agreement has been reached about the nature of the problem and the priorities to be adopted. The difficulty of making a decision is to arrive at that consensus. Formal methods applied to an apparent consensus may be of more use in exposing hidden disagreements than in computing optimal decision variables. Workers in the DSS field have increasingly been trying to help decision-makers to form the kind of consensus that the IKBS paradigm takes for granted; they can sense the need for a new theory.

The World of Business Reality is Socially Constructed

The IKBS paradigm will serve us well in those spheres where we already have a well-formed view of the world, for example in some carefully circumscribed domains of maintenance engineering or medical diagnosis. In such areas there is no need to introduce

extra problems. However, in business, where the central task is to form an agreed view of the world, the IKBS paradigm should be treated with scepticism.

Reasoning from an agreed knowledge base full of logically consistent premises cannot begin until those concerned accept its contents. People will state their personal views of the situation probably objecting to some of the views of other people. They will concede some points but insist upon their opinions being approved elsewhere. Often they will hypothesise an intermediate view of the facts on which the protagonists can compromise. Facts may be limited and they will say what they believe and offer their judgements. After much discussion they will declare what they intend to do promising each other to perform different parts of the task. They will order their staff to do parts of the work and support their commands with threats and persuasion. When things go well they will congratulate one another: when things go badly, one party may blame the other who may feel he has to excuse himself and explain what has happened. Eventually, the customer will declare himself satisfied with the work and payment will be requested. The knowledge base in a business system cannot be an objective picture of the world because it is riddled with uncertainties and reservations that are hinted at by the words emphasised in this paragraph.

Those words are indicative of "performatives", communications that enable language to change to social world, the world of

interrelated obligations. These obligations can often be structured in such a way as to give rise to abstract objects that have no place in the physical world, for example, copyrights, bonds, debts, and contracts, that may even change ownership as though they were household chattels. Evidently much of the world that a businessman deals with is socially constructed. It cannot, therefore, be treated as objective, a reality standing alone upon which a database can pronounce the truth; it can only be regarded as an out-growth from the business use of information. Our purpose is now to explain how performatives are used to do business with words, by forming and reforming the social world.

Doing business

Buying or selling a house is a familiar enough business activity to most of us to serve as a useful illustration of how we use words to get things done. It introduces all the concepts we shall discuss.

Big changes occur when you buy a house, yet the house stays put and you and the vendor do not alter. The whole business is accomplished through the exchange of messages which have social consequences affecting the behaviour of people towards you and the vendor in relation to the house. The focus of our attention will be upon the messages that are exchanged. We shall ask how to classify them according to the functions they perform; we

shall want to know how exactly they have to be constructed and employed in order to effect the kind of change involved in transactions such as buying a house.

After a business transaction has been performed, people behave differently towards one another, often in relation to some object or other. The pattern of mutual obligations changes. Information systems that accomplish this are called (after Bing 1980) 'deontic' systems, from the Greek 'deon'='duty'. The concept includes the patterns of rights, privileges, powers, immunities, and so on, as well as duties. These systems seem to contrast strongly with those that merely 'inform', such as a viewdata system of travel information or advice from a consumer testing body. Systems that convey knowledge without affecting mutual obligations do not exist, except as an approximation, just the approximation made by the IKBS paradigm. From a design or analysis point of view, these 'information' systems are simpler than deontic systems and there is a tendency in the computer world to think of all systems in that way. However, business systems are always deontic because they are concerned with the making, changing and managing of patterns of social behaviour.

When conveying the ownership of a house, the vendor and purchaser employ carefully drawn-up documents. But, no matter how well prepared they are, these documents do not take effect of themselves, they have to be used in a manner that unequivocally marks the termination of old and the initiation of new patterns of obligations. In feudal times this act involved far more

ceremony than it does today; from a ritual performed on the land and property themselves, we moved to one involving a representative object, part of the physical estate, which could be brought to the office of the the vendor's agent, to be handed to the purchaser as a token of his new tenure; finally, the verbal description of the property in the deeds came to suffice, especially now that it is backed by carefully authenticated records in the Land Registry. The careful construction of the contract documents, their signing and witnessing and sealing are part of a ritual (like a wedding) which enables the document to do the job of changing relationships. We must note that two very different kinds of information are being produced.

The Structure of Human Communications

At one level, information is being signalled in a way that might readily be automated: this is the level of:

(1) the 'utterance' that is carried on the documents drawn up by the lawyers acting for the parties. It has two important features. In the first place, it can be reproduced as many times as may be necessary without limit, ten copies will not lead to the making of ten transactions. Secondly, the words on the document signify a possibility, a proposed course of action, and whilst making reference to actual land and buildings, actual people and local governments, in its constituent expressions, the draft contract, as a whole, is a kind of plan which the vendor and purchaser can put into effect if they wish.

Then, at a second level, information is being communicated between people. The social consequences depend upon acts carried out at the level of:

(2) the 'performative', the ritual which involves specific copies of the document in a manner that leads to the planned exchange of ownership being performed. The key feature of the ritual is that it is a sign of the intentions of the parties to perform the transaction. Notice also that the specific tokens, the actual documents employed, are crucial to resolving any dispute about the transaction having taken place. The documents will be placed in secure 'deed' boxes held in safe places, perhaps the fire- and burglar-proof vaults of a bank. Today, in the UK, transactions will also be recorded by the Land Registry.

The legal field is a wonderful source of examples, like the above, of business procedures taking place in slow motion. Here we may find exhibited all the important steps typical of those which mark an adjustment in the pattern of obligations relating people doing business together. Information (documents, signatures, seals, and so on) is used not to convey knowledge but actually to change the social world. (See Kimbrough, Lee and Ness 1984.)

Notice how important a performative ritual is. The whole legal rignarole is pretty complex and unlikely to take place by accident and without due consideration. Just imagine the parties involved getting drunk in a bar and one saying to the other, "I

shay, Bill, I'll buy your house for £100,000". "OK, Frank," says Bill. "Done!" The change of ownership would not have taken place in this case, although for a more trivial transaction this protection may not be there. The most important changes of social status call for even more elaborate rituals. Giving people their names, making and unmaking marriages, are good examples of medium-scale performative rituals, but for the grandest you can turn to the crowning of a monarch or the opening of a Parliament which in Britain involve the kind of ritual that cannot be missed, and that tends to draw huge crowds of spectators for whom the change is significant. This point is important: one of the functions of the ritual is to be noticed, so that the deontic transaction is announced to all those with an interest in it.

Communication Acts

The early work on performatives dwelt mainly on 'speech acts', but in business the need to establish unequivocal responsibility leads to written performatives being favoured. Concrete evidence used to supply this accountability has normally depended upon written documents. We shall need a general theory of 'communication acts' for all modes of expression.

Obviously some of the features of an act performed with spoken or written words, gestures, and even public pageant, may be changed in the light of new methods of expressing them, recording them

and broadcasting them. Information technology invites us to think of new ways of communicating in business, but the special requirements of performatives introduce difficulties that do not affect the simple 'information' systems. We shall examine later these problems raised by deontic systems.

The Oxford philosopher, Austin, in his William James Lectures at Harvard in 1955, "How to do things with words", first gave an analytical treatment of communication acts (or 'speech acts', to use the rather narrower expression favoured by Searle 1969. See also Andersson 1975 and Searle 1965.) Austin was particularly concerned with those sentences that effect changes, such as "I do" pronounced in the course of a wedding ceremony. He called these 'performatives' and treated those sentences which convey a truth, such as "the lady is 21 years old," as essentially different in character, calling them 'constatives'. Later, he treated them as a subcategory of performatives. He distinguished five components of the whole communication act:

(1) the phonetic act - producing the utterance, the sound (or, extending this to the conveyancing example, the written document which functions as a sign);

(2) the phatic act - shaping the sign to conform with the rules of grammar, so that it is capable of definite meaning;

(3) the locutionary act - using the well-formed utterance with more or less definite sense or reference;

(4) the illocutionary act - adding to the propositional utterance a performative (signalled by a special verb such as "promise" or by devices ranging from a tone of voice to a conventional ritual) with the intention of causing a social change;

(5) the perlocutionary act - of effecting a social change among the recipients of the message comprising utterance and performative.

Performatives and their Illocutionary Force

Austin discussed the verbs that we customarily use in ordinary speech to announce the 'illocutionary force' with which we wish to endow the words we are uttering. These he called 'performative verbs' and they include words such as 'ask', 'assert', 'suppose', 'order', 'claim', 'promise' 'appoint', and so on. These verbs are not the only means we have to signal the illocutionary force of our utterances, indeed asking, asserting, supposing and ordering are all signalled by the mood of the propositional verb in the sentence: interrogative, indicative, subjunctive and imperative. This embedding of the performative in the syntactic structure of a sentence represents another but extremely economical way we have of marking the social intention of our communication acts. Besides syntax and performative verbs, the other devices we use are tone of voice (very economical), and ritual, often of a public kind (often expensive).

Now let us begin to apply these ideas to the analysis of deontic systems in business. A computer can be a help in constructing, reproducing and storing utterances, in the sense given to that term above. The computer can decide whether the utterance is syntactically properly constructed, but it cannot ensure that it is a meaningful proposition, that step requires human judgement. (This distinction of Austin's second act into two components helps us to disentangle the tasks involved in using the computer in business. See Stamper 1985a.) Moreover, the computer cannot communicate, in the sense introduced above, which necessarily involves changing the social world, without involving people in adding the performative signal. We must always be clear who is responsible for the illocutionary act. It must be intentional and the act of a person or group with the right authority. A computer may be employed to utter messages of a performative kind but not without many safeguards. Generally a computer would only be used in this way in routine situations, such as the issuing of invoices or pay checks. Such systems would have to be subject to careful managerial control to ensure that their routine demands for money or payments do represent managerial intentions. Consider how strange it would be to have a computer declare "You are hereby appointed Vice-Chancellor of London University." Would there be any point in designing procedures to ensure that such a message from the computer genuinely expressed the intention of the people with the power to perform such acts? When messages purporting to be performatives come from a computer, they will not be treated as such unless the

circumstances make it reasonable to do so. One of the problems of extending the use of computers in business is that of being able to assure people that the messages should be taken seriously. It is a problem of finding technically based but socially acceptable replacements for the rituals and ceremony surrounding our early forms of public communication act, or replacements for direct, face-to-face assurance in our personal communication acts.

We must not assume that the simpler systems used to inform the business man set the pattern for all kinds of computer usage. Deontic systems need different treatment. Within them, information does more than convey propositions; each communication provokes a social change. The economy of the computer is lost if it cannot be used to effect the desired social changes.

What is it that Performatives Perform?

Consider a typical servo-mechanism. It receives signals from an engine (say); these signals tell it what is happening in the part of the world it is interested in - the sensing device is the 'eye' of the regulator. It then calculates what should be done to keep the engine running at the desired speed and it sends a signal to perhaps a small motor which does what the regulator wants; the small motor is its 'hand'. (Notice how anthropomorphic this explanation is. The machines merely

exchange signals in a cause-and-effect chain.) When we use information what happens is rather similar: either the sender describes some thing that he can observe although the recipient cannot, or, the sender prescribes some course of action which he intends the recipient to perform in his stead. (Notice the role of human intentions in this situation. While the machines are wired up to produce their cause-and-effect sequence, people can only intend to have the effect of their illocutionary acts, their success depends upon the disposition of the receiver to perform the appropriate perlocutionary act. We have to explain these dispositions as a part of our account of what performatives perform.)

Of course, people act as they do on account of their likes and dislikes. They communicate their value judgements to one another and use that knowledge to make it worth while to act on behalf of one another.

Ways of Signifying

The kinds of information that get things done in business may be classified using a double dichotomy based upon these two distinctions (Stamper 1973). The first is the descriptive-prescriptive distinction between verbal eyes and verbal hands. The second is the denotative-affective distinction between the information relating to the external world of inter-subjective reality and that relating to the internal world of personal feelings. The resulting four-fold classification may be

depicted as in Figure 1.

A single utterance may be, and most often is, used with all these four significations simultaneously to different degrees. Thus an angry school master might say to a pupil, "Jones, I should stop talking some time before this lesson is over," thereby describing what is happening, recording his low evaluation of it, directing what Jones should do, and implying a measure of threat to induce conformity. You might like to try the same kind of analysis on a typical business communication such as, "Mr. Jones, you should take out some travel insurance with this flight ticket," spoken by the travel agent.

	DESCRIPTIVE	PRESCRIPTIVE
DENOTATIVE	Designations	Directives
AFFECTIVE	Evaluations	Inducements

Figure 1: Four categories of signification

Part of the complexity of natural communications lies in the subtle way we manage to combine many different significations in one sign. When we design computer systems for business use we should be careful not to lose any of these necessary significations. We can help ourselves to recognise the various combinations by using Austin's classification of performatives. Each performative verb signals a particular blend of the four significations. His major categories are:

- (1) expositives
e.g. affirming, denying, stating, describing, reporting,
agreeing, testifying;
- (2) commissives
e.g. promising, betting, vowing, adopting, consenting;
- (3) verdicatives
e.g. acquitting, assessing, judging, diagnosing;
- (4) exercitives
e.g. appointing, demoting, sentencing, dismissing, vetoing;
- (5) behabitives
e.g. apologising, thanking, congratulating.

Apparently (1) has most to do with descriptive signs, (2),(3) and (4) with prescriptive signs whilst (5) relates most to the affective use of signs. Although this is not the place to attempt it, we could probably characterise each performative in terms of the more rudimentary four-fold classification of significations introduced above.

Information Performs a Social Function

Before moving on to look at the economical design of performative transactions in business, let us put to rest one particular misunderstanding. Austin, in his original account of the subject, differentiated what he called 'constatives' from 'performatives', the former being meaningful utterances that have truth values, unlike the performatives, such as, "I promise you £4," which is neither true nor false. Austin found this distinction unsatisfactory, as may be seen from the first of his

classes listed above; the expositives are used to give an utterance a constative role as a proposition that is asserted. "To assert" is a performative verb, one of the expositives, and we should note its social effect. We need to trust other people's assertions otherwise we shall lose one of the major advantages of society: the ability to perceive accurately a world far larger than any that we individually can observe unaided. The law recognises this clearly enough when goods are sold on the basis of description; in these circumstances, a misleading description generates a liability to damages resulting from a false description. Informally, we should all regard as potentially culpable anyone who makes assertions that lead others into danger, with some allowance for the responsibility anyone has to check his information. When the informant is a professional person or a business engaged in selling services or goods, we expect the assertions they make to be trustworthy. In our example of house purchase, the assertions made by the vendor about his property will make him liable to damages if they are false. In the terminology we have chosen, this requires us to subsume systems that simply inform as a subcategory of deontic systems.

Our interest is now directed more specifically at the communications that affect business relationships (see Sesonke 1965 and Anderson 1975). The broader discussion encompasses oral communications but in the business context we usually require concrete evidence for purposes of accountability and cases of litigation,

hence the emphasis on acts of communication employing writing.

The notion of a performative is just the same whether speech or writing is used to encode the utterance involved. When we use documents or other concrete representations, we have the opportunity to account more certainly for the transactions performed.

The Acts Accomplished Socially

The illocutionary force which a performative sign gives to an utterance is used to make a social change. It changes the deontic structure, the system of interlocking obligations, rights, privileges, powers, and so on.

To simplify the discussion, we limit our attention to the kinds of directives that are exchanged between one person to another in an organisation, or those exchanged between the parties to a contract.

A fundamental concept here is that of an obligation which imposes restrictions on one's conduct. Obligations, presumably, are at odds with the self interest of the individual; e.g. there is no need to oblige pleasurable behaviour. Obligation is used as the basis for so-called 'deontic' logic to model ethical and legal systems (see von Wright 1968, Hilpinen 1981a & b). It is interesting to note the logical interrelationship of such concepts as obligation, prohibition, permission and waiver. To account for the effects of performatives, we are looking for a

method of describing the deontic structures which they change. One possible solution would be to employ deontic logic. These are its special, basic constructs:

- O p = action p is obligatory
- O -p = not doing action p is obligatory
i.e. doing p is forbidden
- O -p = it is not obligatory not to do p
i.e. p is permitted
- O p = it is not obligatory to do p
i.e. p is waived (there is immunity from doing p)

A deontic system employs these concepts: typically they are included in sets of laws, rules or regulations. The rules and procedures of a business firm thus constitute a deontic system in this sense. Many of the norms involved in business are informal but still involve a notion of obligation to support them. Many other norms are made explicit and are what we call 'rules'. The degree of rationalisation of the system depends upon the extent to which the norms are made explicit in this way. Bureaucracies are characterised by a high level of rationality in this sense.

The degree of rationalization is an important dimension in current organizational theory (e.g. Galbraith 1973 & 1977). In a business firm the main function of its deontic system is to facilitate coordination. Increased rationalization is therefore a device for coordinating highly complex tasks, e.g. operating an automobile plant. However, the degree of rationalisation depends upon stability of the situation in which people work together.

Orthogonal to the dimension of task complexity, the environment of the organization may vary along a dimension of uncertainty, i.e. the incidence of surprising or unpredictable events that require adaptation. As uncertainty increases, the usefulness of rationalization declines, since the procedures must be continually revised during the task execution.

We shall return, later in this chapter, to the study of how to fit the deontic structure to the levels of complexity and uncertainty. For the moment, we shall look at two basic performatives - the promise and the contract.

Promises and Contracts

Let us first look at 'promising'. This is not a business transaction because it is quite one-sided. We may analyse it in the four-fold framework introduced above:

PROMISE	<u>description</u> of circumstances leading to the prescribed behaviour	<u>prescription</u> of the promised behaviour
	<u>evaluation</u> is positive for the receiver of the promise and negative for the giver	<u>inducement</u> to keep the promise can be little more than a general sense of social obligation

(Notice that a promise may be transposed into a threat if the evaluation conditions are reversed.) With this basic device

available we can now evolve a more powerful kind of transaction that is basic to business - the contract.

The common form of contract involves two mutually interlocking promises. On the one side, party A provides some good or a service for a 'consideration' due from B, in exchange. Thus:

CONTRACT

PROMISE BY A TO B

description:
of consideration

evaluation:
consideration
worth more than
supply

prescription:
of supply

inducement:
own evaluation
plus legal
and market
sanctions

PROMISE BY B TO A

description:
of supply

evaluation:
supply worth
more than
consideration

inducement:
own evaluation
plus legal
and market
sanctions

This simple deontic structure will help us to understand the process of evolution in business transactions. With its aid we can see how a variety of performatives is used to construct the desired system of mutual obligations and how, gradually, we have evolved a repertoire of performative tokens to make it more efficient to alter the deontic structures relating people.

The simplest business transaction is probably barter. Face-to-face, with the goods to hand, this entails little communication. The goods do not need to be described, although they may need to be demonstrated or have their virtues displayed so that the parties to the transaction can make evaluations of them that ensure the negotiations will proceed. If and when they have

formed the pattern of evaluations and inducements shown in the above table for a contract, the goods will change hands.

(In a more sophisticated kind of barter transaction, the parties have to describe the goods or services to one another well enough for the potential recipient to judge the value of what he might receive. In the present state of our ability to make accurate and trustworthy descriptions this is difficult, so transactions of this kind are rare, confined to parts of the alternative society or the hidden economy, and to some East-West barter deals. The difficulty of barter is that of matching requirements.)

Obligations and Rights Abstracted from People to Things

Gradually certain commodities became recognised as in sufficient demand on a regular basis that it would generally be safe to make them one side of any transaction. There existed, as it were, a guarantee that somewhere in the society one could trade in this proto-money for bundles of goods and services that one might actually consume. There existed, in such commodities, a de facto right to have its value restored in concrete terms. We see here the growth of a right in rem which inheres in an object, unlike the more elementary right that inheres in a relationship with another person (in personam). The evolution of other means of abstracting rights from personal relationships so that they are carried by objects (the ownership of which confers rights upon the owner in relation to any other person), has been

vital to the efficiency of business transactions and the growth of personal freedom (or licence, depending upon your point of view).

Note carefully what is happening at this stage of evolution in information terms. Certain commodities become recognised as widely valued in a society. If one of these is employed in a barter transaction the information needed to arrive at the necessary evaluation/inducement structure will be reduced to almost half because one party will know exactly what he is being offered and he can translate it into a second transaction for a specific good that he wants. In this manner, quite informally, the norms of the society confer upon these readily exchangeable commodities the power to encode value signals more economically than before. We are beginning to see the early shape of objects that appear to carry a bundle of privileges along with them.

The State is in a position to generate objects of this kind by providing explicitly the guarantee of value (which arises informally for substances such as gold) by promising to make a suitable exchange whenever the owner desires; we see this, as discussed later, in the creation of paper and other symbolic forms of money.

This story could be continued to show how we have evolved many and varied legal, social, and organisational abstractions that function as though they were objects carrying rights, privileges and duties. We have just looked at money but we should not

forget copyrights and patents, nor the roles in state and organisation (president, chairman, commander-in-chief, etc.) to which people are appointed (performative verb). All these abstractions have the value of simplifying changes in the deontic structure. When they change hands we alter at a single stroke a multiplicity of direct interpersonal relationships of obligation.

Money: An Instrument for Conveying Rights

As a prime example of a token with a clear performative role, we can usefully trace very briefly the history of money. On being transmitted to another person, money confers on him certain rights. Informal culture associates these rights with natural objects, or at least ones in common demand in a society. On the other hand, an institution with sufficient power can endow any suitable kind of sign with the property of money.

One of the signs required to construct a well-formed communication act is a particularly important one: it is a token with guaranteed individuality and identity, which signals the unequivocal intention of the communicator. Objects that function as money can act as such tokens. Others are often called 'near-money' and include cheques and negotiable securities, which amount to highly reliable promises for money. So-called 'funny money', the money of account used within organizations, also has this character in that it is a derivative of budgeting schemes which impose restrictions on the transaction activities of departments. Accounting procedures which employ books of

account in lieu of monetary objects have the job of ensuring that the performative signs maintain their identity and integrity, so that they can take the place of clumsier physical tokens.

Money evolved naturally in barter economies as goods that had widely recognized values that served as a useful intermediate storage of value in cross-temporal transactions. In Homeric times, cattle were often used. Salt was employed in Abyssinia, while cowrie shells were used in India, the Middle East and China; dried cod in Newfoundland; tobacco in Virginia; and sugar in the West Indies. It would be interesting to investigate the extent to which present day commodity exchanges appear to play a role analogous to that of the money market.

"Coinage evolved as a certification of a unit of weight and purity. While coins were convenient for small transactions, they were too cumbersome for more substantial trading. Banks evolved to facilitate these transactions by storing the coins and maintaining accounts. Larger transactions could be accomplished by directing the bank to transfer money from one account to another." (Adam Smith 1776, p23)

"This gradual realisation, that anything can be money as long as people have confidence in it as a medium of exchange, is the basis for our current conception of money." (Morgan 1965, pp 22-23)

Scherman (1936) expressed his strong suspicions about the gradual replacement of gold and silver coinage by unique, identifiable records of promises for money. Scherman was concerned about the reliability of these promises, and had a deep distrust of governments in this regard. He cites the dangers of so-called 'fiat money', consisting of paper promises issued by governments, without backing of gold and silver coin. In a chapter entitled "How Paper Money Originated for the Fraud of Rulers", he cites numerous examples of monetary collapse caused by insufficiently backed paper money.

Money that is Socially Engineered

However, fiat money may not be so unworkable as Scherman claims. Indeed, it seems to fulfill the various desiderata cited by Adam Smith earlier. The major difference is that its supply is controlled by an artificial scarcity rather than a natural one, as for gold and silver. In that, we are dependent on the trustworthiness of the issuing government (which, as Scherman notes, is often doubtful). The reality of money is rooted not in the physical world but in the system of norms that ensure that the chosen tokens are a stable encoding of the values in the society - gold is a good monetary token because it is widely believed to be readily exchanged for other goods and that expectation is buttressed by the popularity of gold as a personal ornament and vice versa. A government, having the power to create norms can, provided that it does so in a stable, reliable manner, substitute any other token for gold. Whether fiat money works or not

depends upon the deontic system that gives it meaning.

Another important feature of fiat money is that it is essentially symbolic. Clearly, paper and ink have little to do with artificial scarcity. It is here that money intersects our concerns with performatives needed to execute communication acts using computer technology. Fiat money is a highly generalised form of performative sign. It is a unit of purchasing power, i.e. a right (in rem) to the acquisition of goods and services in the marketplace. In that sense it functions just like the money of account used within organisations, but within the larger governance structure of contract law. Just as 'funny money' seldom has a physical existence as uniquely identifiable tokens, neither is this necessary for fiat money.

One continuing factor in each innovation of money in its long evolution has been a reduction of transaction costs. Oxen were no doubt a useful store of value in Homeric times, but they were certainly clumsy currency. The evolution of coinage brought a simplicity in measuring the value of currency. Money substitutes, such as bank notes, offered greater portability of money. It could even be transferred via postal letters.

We are now open to the possibility of even further reductions in transaction cost in the vehicle of electronic money. Aside from the tendency of governments to over-issue fiat money, electronic money presents us with additional control problems. These are

similar to the problems of managing other performative signs in electronic form: preventing forgeries and loss. But the nature of money, as an entity in which rights inhere directly, generalising the notion of rights in relation to just one other person, creates special problems. Contract-signing protocols will not work here since money, by its definition as a medium of exchange, is a right not to any specific party, but to whomever happens to be the possessor at that moment.

The Root of the Technological Problems of Performatives

Money is one of the key examples of those numerous devices for encoding the performatives that alter the relationships among people who are doing business. Contract documents are others; the parties to such linguistic acts become at that moment obligated to perform their respective duties as set forth in the contract text or according to the established practice. Other common performative communications in business include purchase orders, bills of lading, insurance policies, mortgages, deeds, licences, leases, cheques, bonds, stock certificates and so on. Communications internal to an organisation may also be performative. A key example is the corporate charter itself; others are job tickets, duty rosters and the paperwork associated with interdepartmental transfers of material or labour. Indeed much of the 'red tape' encountered in bureaucratic organisations arises from the need to construct fool-proof systems of performative communications. (See Lee, 1984 and also Flores, 1980, Lyytinen, 1984, and Kimborough, Lee & Ness, 1984, for further

examples of business performatives.)

It would be interesting to trace, for each of these examples, how they cause changes in social relationships - creating, abrogating and transferring obligations, rights, privileges and duties. Our examples of promises and contracts will have to suffice. For our present purposes, what concern us most are some common properties of performatives that are generally supplied by well-constructed documents of a conventional kind.

When in business we make communications that significantly change the obligations that people have, we take precautions to ensure that there can be no confusion about the source of the message, and that it is made with serious intention and the right authority. Informal communications of this kind are acceptable only where the protagonists are well known to one another and they understand the circumstances well. That works within tightly-knit teams or in specially constituted financial markets where the members all know one another. Generally, however, documents are necessary to guarantee accountability. Simple announcements of facts can be printed repeatedly but the essential feature of the key performatives is that they are unique and unequivocally made intentionally. They usually carry a signature of the responsible person to symbolise the exercise of the relevant authority. Even the majority of simple statements of fact (expositive performatives) carry the name of a person responsible for printing or publication (at least this is a legal requirement in the

UK). Communications that alter the deontic structure take effect from the time of their first being deliberately expressed; copies of the original communication have the status of being about the performative but they can never be regarded as the performative itself. Accountability is their essence.

Forgery

Thus, forgeries are problematic for performative documents. If successful, the forgery of a cheque or an order will result in the usurpation of authority. For this reason, in addition to a signature, performative documents usually are made on special paper or with a seal that is difficult to copy, for example the special paper and magnetic encoding of bank cheques, or the imprint stamp used by a notary. Conventional documents offer many forms of subtle redundancy that makes them difficult to forge.

It is the control of forgeries that makes performative communications difficult to automate: the flawless copy is fundamental to computer technology. Data are never moved, as we move paper; rather they are copied and the original images later erased. Indeed, with virtual memory systems and distributed databases, the notion of data having a specific location is totally lost from the user's standpoint. The automated performative needs to have carefully constructed redundancy to ensure its uniqueness and accountability, for (remember) possession of many performative tokens signifies possession of a bundle of

rights and privileges.

Our usual concept of possession, however, is a very physical one. We have yet to find its analogue in the ephemeral quality of data in computer networks. Some of the problems can be grasped by looking at the examples of communication acts which have been cited earlier. They all change social relationships when someone has acted with clear intention and right authority. The communication can be analysed into three signs:

1. a locution to define what should be done	+	2. a performative to supply the illocutionary force	+	3. a 'signature' to define the authority
---	---	---	---	--

The communication tends to be built up in that order. First the locutions is created to express the objectives of the transaction. For example the details of a contract may be negotiated. Next a performative sign is attached to the closed course of action; that will be the locution transcribed onto the special performative document ready for the third step of signing it. Only then is a complete communication act performed.

The whole act is unique and the uniqueness is accountable so that the agent may be clearly responsible for his act and so that the possessor of the performative token, where relevant, may have his entitlement to the rights it conveys established and open to trial.

The easiest way of constructing such a unique token is to make

the communication in public so that it is widely recognised or remembered as signifying the intention of the communicator. We set up a ritual that involves enough people doing rather special things that it could not possibly happen by accident or be reproduced. This clumsy method suits pre-literate societies. Today we supply the ritual, unique element in our everyday transactions, by using special paper, often with uniquely numbered sheets, adding signatures of the communicator and of witnesses to his signature, even in some cases embellishing the document with seals and stamping it with marks that can be traced back to an instrument that is kept under close control. Somewhere on this document which has been made unmistakably unique by all this paraphernalia, there will be the locutionary sign, which can exist harmlessly in multiple copies before and after the communication act is made. How can we, using electronic devices, signify reliably this kind of deliberate exercise of authority?

The problem of forgery does not involve the locutionary sign which can be reproduced endlessly without trouble; it is a problem of the performative sign conjoined with the signature or other token of the deliberate, and intentional act of the agent. If successful, the forgery results in a social change (a new pattern of indebtedness by a forged cheque), without the intention of anyone authorised to cause it.

Automating Communication Acts

When we try to automate communication acts, as opposed to acts of signalling that are proper to computers, we are tempted to reduce the sign structure to an instantiation of the locutionary sign type. This kind of solution will work only in some very restricted situations where access is rigidly controlled and the use of the system is monitored by manual procedures that can be audited. Perhaps the only situation where these safeguards can be dropped is in the case of a system for playing with fictions or hypotheses that are denied by their illocutionary force from causing social changes. Computers raise no problems in the handling of locutions but how do we enable them to handle the performatives and 'signatures'?

Look at the performative documents we have mentioned. How can we achieve the integrity and redundancy that mark the clear intention of the communicator? Data in a computer never belong to a specific physical location.

If we do not have the possibility of preserving an object, a performative document, that represents the communication act, we shall have to find radically different methods. One approach that seems promising uses an application of public key cryptography to enforce contract-signing protocols between two parties. It is based on the notion that a signature is actually a public secret; it is (supposedly) readable by everyone, but only the original author is able to reproduce it. In a recent paper of

theirs, Even, Goldreich and Lempel (1985) show how to simulate this electronically. They assume a situation in which each party has N pairs of secrets (encrypted bit strings), which only the author can decode. The two parties exchange their secrets, one pair at a time, through a 'coin-flip' mechanism that randomly selects one item of each pair belonging to each party. Thus, at the end of the transfer, each party will have N of his/her counterpart's secrets, but the sender will not know which N of the $2^{*}N$ possible sequences was actually sent. Each party accepts commitment to the contract if the other can supply the solutions to a consecutive pair of encryption puzzles based on the transmitted secrets. Subsidiary protocols enable cheating to be detected with a high degree of probability. Notice that an elaborate ritual is involved, with a high level of redundancy, resulting in each party holding a memory of the event that cannot easily be falsified.

Electronically, some of the informational features of the old fashioned performatives have been reproduced. The nearest parallel is perhaps with the mediaeval device of the 'indenture' in which a document torn apart along a deliberately very jagged, irregular, saw-toothed line (hence the name), carries in the rich redundancy of the tear what amounts to a mechanical 'signature'.

The electronic approach of Even, Goldreich and Lempel will not be suitable for money. It is appropriate for a transaction invol-

ving two parties between whom obligations are created, that is for rights in personam whereas money confers rights in rem. which are transmitted allong with the token to whomsoever has legal title to it. Somehow we need to provide a similar kind of redundancy which is not open to public scrutiny to serve as the electronic equivalent of the rich redundancy obtainable through traditional performative documents or rituals.

The Deontic Structures of Markets Compared with Organisations

So far we have examined performatives in the very limited deontic situation of the contractual relationship between two parties. Such relationships are the foundation of market mechanisms.

Deontic systems also play a fundamental role in our understanding of economic organisation more generally. Williamson (1975 and 1979), considers the factors which determine when a society allocates its resources via market mechanisms or through organisational hierarchies. The principal difference between these two is that they offer alternative forms of 'governance structures', to use Williamson's expression, or in our terminology, 'deontic systems'. A market system operates under a general purpose deontic structure of contract law whereas organisations may construct specialised deontic systems. Key factors influencing which of these alternatives is the more appropriate are the idiosyncrasy and frequency of transactions between suppliers and consumers. A highly idiosyncratic transaction is one where there are few alternative suppliers or consumers. The converse

case is that of routine transactions where there are many alternative parties. A third factor, the uncertainty surrounding the activity, may also influence the choice of deontic structure. In general, where one encounters transactions which are frequent and uncertain and idiosyncratic, there one will find the greatest need for organisation.

Market governance is most appropriate for non-specific transactions of either low or high frequency. Idiosyncratic transactions of low frequency are best supported by a 'tri-lateral governance', involving an intermediate agent to arbitrate between the parties, e.g. and architect in construction contracts. 'Bi-lateral governance' involving long-term two-party contracts (e.g. OEM arrangements), is most appropriate when there is a high transaction frequency but only medium idiosyncrasy, and the 'unified-governance' of a vertically integrated organisation is most appropriate for high frequency, highly idiosyncratic transactions, especially if they are uncertain.

Williamson argues this case in terms of the transaction costs that arise in each situation. One systematic way of examining these costs is in terms of the simple deontic structure for a contract suggested above. We may identify the information needed to conduct the transaction by using that framework:

denotative information This must point at both the goods and

services to be supplied and at the consideration to be offered in return.

affective information This must be sufficient to allow each side to evaluate what the other is offering and to appreciate the pressures inducing them to adhere to the contract.

Routine transactions have the virtue that they are easy to denote. Of course, the consideration is normally money in some form, and that side of the bargain is usually relatively easy to describe even though it may be not simply cash-on-the-nail but a more or less complex arrangement of extended payments. This kind of routine communication calls for relatively little investment. Even that can be reduced by using information technology, including computer systems to facilitate the searching of lists of suppliers and their catalogues. A market place, where many buyers and sellers have established a well-understood terminology for the description of this range of standard goods and services, will have accumulated the collective investments needed to solve those key parts of the information problem.

The idiosyncratic transactions occupy the other pole. They are peculiar to the purchaser although they may be either occasional or recurrent. In both cases, these specialist supplies will be relatively expensive to describe. This part of the transaction cost can be lessened by employing those who are specialists in the relevant field, such as architects or consulting engineers, to create the descriptions and arbitrate on their interpretation.

the use of third parties or brokers is more appropriate when these idiosyncratic transactions are occasional. Once they become relatively frequently recurring, it becomes possible to economise further by incorporating the two sides into a single organisation.

Let us now consider what affects the relative efficiency of evaluative information gathering in various circumstance. The dimension of routine to idiosyncratic requirements is most relevant. A market in goods and services that are widely used and understood can supply evaluative information very cheaply indeed through the price mechanism. Supplementary evaluative information is also available through consumer reports and trade intelligence, which can share the experiences of a population of even relatively infrequent purchasers who need not be seriously disadvantaged compared with the regular purchaser. Where the requirement is idiosyncratic, there is a risk of opportunism on the part of the supplier. Again, the defence against this is either to employ a trustworthy broker for occasional transactions or to link supplier and customer in a vertical organisation to exclude the market and administer the transactions. Thus complexity also makes evaluative information costly and favours administration compared with the market.

Finally, we should look at the role of the information that induces the participants to a contract to meet their obligations. In a coherent and stable market structure with standard products

and large numbers of buyers and sellers having access informally or formally to market intelligence, reputations are easily recognised and adjusted or made and lost. The opportunist has greatest incentive to take excessive profits when there can be no readily available channel of information through which the buyers can transmit powerful inducements. This is more serious when the transactions are occasional than when they are recurrent and the continuance of the business relationship is at stake. An organisation, with its internal hierarchy of authority and its elaborate system of rewards and sanctions is far better adapted to the supply of inducements for the regulation of complex, idiosyncratic transactions than a market.

Contracts are not formed by the two parties in isolation. The rules they make for one another are made in a framework of norms established by the wider community. A market can do most of the relevant norm formation quite informally, especially if there is adequate market intelligence available to all participants. Close physical proximity among participants is conducive to this kind of exchange and to the dynamic making and remaking of informal custom and practice. This important aspect of a market's efficiency can be improved by government regulations about the publication of information and by institutions which provide a framework for voluntary regulation. But rules are very difficult to make informally when there is little regularity. In these cases there is a stronger need for legal and institutional norms to make contract formation effective. The extreme version of this is the organisation that provides a firm deontic structure

upon which the performative transactions can bring about subtle changes of mutual obligations among a whole team of people.

Performatives in Contractual Situations

It may appear that we have forgotten the performatives which are the main subject of this paper. In fact, the whole of the above analysis of the costs of contractual transactions was structured according to the classification of the information required by the performatives that would be employed in its expression.

A contract will be constructed in phases that are signalled by the illocutionary force of the communication act employed. First, the buyer will enquire about the possibility of his requirement being met. This will complete the denotative part of the structure leaving the participants with an understanding of what would result from the completion of the contract. In an even simpler first step, the vendor will offer a familiar article for sale. But in a very complex first step, the customer and supplier will negotiate at length with the aid of professional brokers about the nature of the goods or services. The second step will be for both sides to say that they agree to the hypothetical description. Next, the buyer and seller will each assess or value or price the goods or services in order to form a picture of his own side of the bargain. Depending upon the custom and practice in the market, they may ask or offer a variety of prices and, at the fourth step agree what the consideration

will be. Each will respond to the informal, institutional and legal information about the form which a contract may take and about the execution of it; all these inducements will be communicated with the illocutionary force of warning, advising, requiring, obliging, permitting, allowing and so on. It is the final stage, when the parties put their signatures to the contract, that their jointly constructed obligations fall upon them. The strength of the obligation depends much upon the social inducements of contract law and custom. (Note the deficiency of deontic logic which treats obligation as given in some mysterious way.) So we have illustrated how the performatives dictate a sequence of social changes that culminate in the construction of a contract, a vital piece of our social reality.

Anyone who is interested in looking further at contracts may like to consider the use of performatives at the conclusion of the work. There will be statements of work done, claims for rectifying parts of it, the final acceptance and the request for payment but much could go wrong and looking at the possibilities you will find illustrations of many more performative verbs at work. Some of these verbs are used to provoke social changes that only make sense by taking into account the enveloping system of legal and related norms, those which make it feasible to pay by money are the most obvious examples. The contract is clearly just a fragment in a wider system.

Binary contracts, where they are the appropriate basis of cooperation, together with money, provide the key mechanisms of the

market governance of economic activity. The obligations they create are limited and, when they are met, the participants are free to seek other liaisons. This accounts for the flexibility of markets but it only works that way when the contracts are relatively simple. Elaborate contracts will produce long-standing and complex deontic structures that tend to be anything but flexible. Alterations to a contract are nearly always resisted by one side or the other simply because the two sides operate with different profit incentives. Flexibility and transaction economy are not always best supplied by markets.

Deontic Structures of Organisations

The structure of a deontic system in an organisation is far more sophisticated and open to variation than that which governs a binary contract. It does, itself, entail one important kind of contract, that of employment, in which the organisation obtains for the financial consideration of a salary, the conformity of an employee to its system of norms or rules according to which he exercises his skills in the performance of some fragment of the larger enterprise. The simple four-fold contract model, used above, will also handle the employment contract. But the description of the internal norm structure requires a far richer set of concepts.

Here we can give only the briefest outline of a general norm structure. For more detail in a legal context see Stamper 1980.

It has been derived from a study of legal norms, especially those which define the tasks performed by certain large organisations, the departments of government that administer tax, for example. The same kinds of explicit structures are visible in the laws governing parastatal bodies and in the structures of the police, armed services and universities. We are interested in their deontic features that are all independent of the specific organisational tasks.

A team with a common objective will find its own organisation, given long enough. An organisation is also a team of employees and it will also act largely according to informal norms, directing its members' efforts towards the accomplishment of the corporate goals. The directors of the organisation will be the custodians of the goals, sustaining them altering them and interpreting them but maintaining them in accord with the need to sustain at least some degree of consensus among the team as a whole. The organisation's structure will be a means of interpreting the overall goals in a structure of subsidiary goals which simultaneously direct and coordinate the efforts of subgroups as well as of individuals. It may be sufficient but it is always necessary to design this goal structure and keep it in repair; the rest of the organisation can be informal.

As the organisation gains experience, it will encode its knowledge as formal rationality. In addition to having a goal structure, it will gradually discover how best to achieve them. Wherever the tasks and the environment remain reasonably stable,

the way to achieve the goals at those suitable levels will be specified with greater precision. Informal methods will fill the gaps but they too will usually be governed by a norm structure. There will still be room for ad hoc behaviour where the unpredictable happens and human conflicts of value arise. The balance between informality and rationality is a key determinant of good organisational design - the rationality encodes solutions and the informality preserves the capacity to find better solutions or solutions to unexpected problems.

The rational structure is the deontic structure. We should include within it both the explicit norms or 'rules' and the norms which people obey without their having been stated explicitly. The rules usually emerge from the unwritten norms.

A rule structure will exhibit several different hierarchies and it is convenient to describe the major characteristics of these deontic systems in terms of them. The first is a hierarchy of domains of action which gradually increase in their scope and importance. The second hierarchy involves the norms that supply the inducements to conform to norms at lower levels; this is the gubernatorial hierarchy, so called because it deals with the control of the rest. The third that will be mentioned in this paper is a procedural hierarchy of norms that tell people how to communicate information relevant to the other norms. The structure as a whole can help us to explain how our performatives function.

First, let us look at the action hierarchy. We get thing done through rules basically by formulating Standing orders which prescribe certain actions to alter the physical world in certain described situations:

in these circumstances	->	do this
(hypothetical description)		(prescription)

The norm is general and it takes effect when a specific description fits its condition (on the left) and it then generates a specific command from the expression on the right to a specific person or group. This is one kind of action rule but organisations depending upon these alone would be very clumsy.

It is necessary to evolve a whole range of organisational or social abstractions that act as a short hand for ranges of situations deemed equivalent. Thus we can refer to a 'batch' of goods regardless of how it is arranged or at what stage it stands in the production cycle. We use notions of 'shift', 'priority', 'schedule' and so on, but most important of all the notion of a 'role' or collection of tasks carried out by the same person but abstracted from the particular incumbent. The role concept enables the organisational structure to exist independently of the shifting population of employees. We then make use of another kind of norm which affects not the physical world, but the status of the world of organisational abstractions. When the specific conditions are met that trigger these so-called status

norms no one does anything, but the social world changes - this is one of the key functions of many of the performatives described above. Status norms have, in the long run, a greater potential effect than a standing order.

Armed with standing orders and status norms, we should still have difficulty in constructing a practical and viable deontic structure. We should be faced with the difficulty of making sensitive use of a vast edifice of rules that all operated at all times. We normally overcome this problem by using another category of norms which we call powers of intervention. These are norms that act upon other norms by making them effective or inhibiting their use. These are powers in the sense that they confer discretion upon some people but not on others. This type of norm cannot be automated. These powers are exercised using performative verbs such as 'claim', 'withdraw', 'invoke', 'override', 'excuse' and so on, but within any bureaucratic system, they also tend to require clear documentary support from performative documents.

With standing orders, status norms and powers of intervention, we could have a large yet sensitive deontic structure but it would be static. Yet another kind of action norm is required if we are not to have an organisation incapable of adapting to changing circumstances. These are the powers of rule making. Each such norm gives, to some person or group, the authority to make, amend or abrogate certain classes of rules but always within constraints. Thus the law of contract is the source of the power to

make the rules by which the parties govern themselves, and it also contains many constraints upon the legitimate forms of contracts and their interpretation. In any deontic system there will be, relative to that system, a key power of rule making from which all the others are derived, this is its Grundnorm. When rules are made, the social change is effected by the appropriate authority making the right communication acts. These will be expressed using such performatives as 'direct', 'rule', 'counter-mand', 'amend', and even words such as 'advise' and 'recommend' can form rules of limited force. Each manager in a company has the power to make rules within the limits established by higher authority; the powers of rule-making are crucial to the design of the organisation.

Finally, the whole edifice of action norms is held together by structure norms which handle the branches of the hierarchy. The condition of a structure norm may be like any other condition but the consequence will always be a list of other norms, either action norms of any kind or more structure norms that extend the hierarchy to greater depth. Thus the structure norms create a tree, rooted in the relative Grundnorm (company charter) and spreading out its branches of power to every corner of the organisation.

The second hierarchy of norms deals with the formation of inducements. The bottom level consists of the substantive norms, the ones expressed directly in terms of the men, machines, materials,

etc., that are the substantive concern of the business. However, just in case they are not obeyed, we have to create another layer of norms that prescribe sanctions when non-compliance is observed, or prescribe rewards when the lower norms have been followed effectively. Similarly, these reward- and sanction-granting norms themselves may or may not be followed, so we need yet another layer to ensure that they, in their turn, are obeyed, and so on. This hierarchy makes the notion of obligation concrete and we call it the gubernatorial hierarchy.

The third hierarchy of norms deals with the communications involved in exercising any of the other kinds of norms. In the context of our special problem of performatives, these are the norms which, among other things, would lay down the details of any ritual or bureaucratic procedure which gives rise to an effective communication act. Thus to apply for leave in an organisation, one may have to use a specific 'application form', complete it fully and have it counter-signed by certain other people. This procedural hierarchy deals with all the sub-components of a communication act; it may specify the utterance act by specifying the language or kinds of codes to be used, it deals with the locution by saying what the communication must be about, it prescribes the illocutionary force (claim forms, report forms, order forms, and so on) and it can define precisely the perlocutionary act by saying which records are to be updated, and which rules are to be applied to the contents of the communication. This procedural hierarchy is the exclusive focus of attention of the conventional data-processing paradigm; it is

the bureaucratic system.

The deontic structure of an organisation is vastly more complex than that of a binary contract. This is both a strength and a weakness. Simple contracts may only make use of standing orders or the even more basic commands which are not norms but specific instructions. The surrounding law of contract and the custom of the market will supply the norms to deal with changes of circumstances and departures from the terms of the contract. In principle, organisations have flexibility built into them, whilst a market derives its flexibility from the limited nature of the individual contracts. Organisations become rigid when they come to exist for their own sake and not to attain their substantive goals. A common symptom of this organisational rigidity is growing bureaucratisation, which cannot necessarily be solved by reverting to market governance. Perhaps one of the quickest ways to induce crippling bureaucratisation is to impose poorly designed computer systems that are difficult to maintain. We hope that the new, emergent, deontic paradigm will help us to think more clearly about the form and functioning of organisations.

The Functions of Performatives in Organisations

Previously, we explained the deontic structure of contracts and then showed how communication acts were able to make and use this relatively simple deontic structure. We have thus outlined the

rich deontic structure of an organisation, so we should now use this idea to explain the functions of performatives that give our communications their social force in an organisational context.

Imagine the organisation as a kind of mechanical structure consisting of bodies of knowledge and belief, of expectations and intended acts related to different individuals and groups, all of these being linked together by pulleys and rods that make them interact - these linkages are the norms. A deontic structure is not at all mechanical but the image will serve our purpose. This structure undergoes constant changes as the people involved communicate with one another. Each meaningful utterance will act upon the structure with the illocutionary force that has been given to it by its performative component. It is as though the performative were the vector directing the communication act onto the right part of the deontic structure to make the desired changes in the obligations, beliefs, goals, and so on, that form the social reality.

Let us try to illustrate how these changes take place, how performatives function. Suppose the organisation involves two departments that are like the supplier and customer in a complex, idiosyncratic transaction. Mr.A, the manager of the internal 'customer' will request a supply of widgets able to do XXX, call them XXX Widgets. This request will establish what Mr. A believes possible and desirable. The constitution of the company automatically generates an obligation upon Mr. B, manager of the Widget Workshop to attempt to supply this product. (Note

the immediacy of this deontic change.) But B believes that the best they can do is to supply XXY Widgets. When inter-departmental discussions have failed, a status norm enables this to be recognised explicitly. This new social fact automatically generates an obligation upon the R & D department to help bridge the gap between A's perceived needs and B's capabilities. (This very specific and swift response to a complex consultancy requirement would be difficult for a market to furnish, especially as the internal experts have a huge investment of relevant experience to draw upon.) A Task Group might be formed perhaps with a ready-made constitution that everyone is familiar with. The power to make rules has been exercised. The problem appears to arise partly from a lack of mutual understanding of technical issues, which is gradually removed through the discussions and experimental production runs engaged in by the Task Group. (These innovative situations are ones for which the market is generally ill-suited if only because the elaborate process of reaching mutual understanding would be prohibitively costly if attempted with several suppliers, and because the process would often involve disclosure of commercially valuable knowledge.) The solution proposed by the Task Group might involve purchasing a new machine tool at a cost of \$200,000, a figure that automatically allows the Finance Director to invoke a review procedure. He does so, and the final product requiring XXX widgets is studied from a marketing point of view, with the result that the earnings are seen to be very great. The exercise of powers of intervention resulted in the making of a new and larger context

of enquiry to enable profitability to be studied from a company-wide angle, rather than from the perspective of individual departments. Finally the investment is made and the standing orders governing the execution of a project are activated in order to generate the direct commands that appear in work schedules. It seemed unnecessary in telling this story to write the dialogue and picture the performative documents imparting the communication acts at each stage. The overall message is that human communications do far more than transmit copies of character-strings from one location to another; human communication acts alter a deontic structure.

The Practical Significance of Deontic Systems

We have already looked at the technical problems that arise when we use computers to handle performatives. Looking behind the performatives at the social structures that give them their special significance, we discover the elaborate systems of norms that encode organisational knowledge. (See Lee 1985.) The deontic system is a knowledge structure.

One practical result of the analysis is to reveal how limited is the IKBS paradigm for understanding organisational problems. By all means use this limited model as an approximation where the problem domain is relatively well understood. But be careful about transporting the attitudes of the IKBS paradigm into areas where the central problems are resolving conflicts of interest or understanding. In the IKBS view, the world is given: in the

deontic paradigm, people construct the world of business affairs.

Another practical result is to direct attention to the structures displayed by organisational knowledge. If we can represent a deontic system as a knowledge-base, then we shall have a way of removing from the application programs of a computer system the information that is specific to the organisation but not concerned with the use of the computer. The confounding of these two complex sets of knowledge is one of the main reasons for the costly rigidities of computer systems.

Finally, we should point to the appropriateness of the deontic paradigm in the field of decision support systems. By exploring the norms that relate the people in an organisation, it should be possible to be more sensitive and accurate in devising methods of supporting group decision-making. Whereas the IKBS paradigm is useful in the design of support for individual decisions, the deontic paradigm is more relevant to decisions involving several parties who need to reach consensus on their understanding of the problem and evaluation of outcomes.

The ideas for this collaborate paper have arisen naturally as outgrowths from the authors' major research studies. One has been working on a language, CANDID, for the formalisation of contracts (Lee 1981) whilst the other has directed a project to create a language, LEGOL, for representing legal and business norms (Stamper 1985).

Conclusion

It seems appropriate to conclude a paper that argues for a new paradigm, and claims that its adoption would have a number of valuable practical consequences, by proposing research that would begin to realise these claims. Each of the authors, individually, has already undertaken much of the necessary preliminary work. The fusion of these separate strands appears possible and desirable. The following is a sketch of a programme of research on rule-based systems, exploiting the theory of deontic systems and performatives, outlined above.

The programme would have two major components that would proceed in parallel:

- (1) the study of parts of some large bureaucratic systems to develop a methodology of investigation that would aim to create descriptive techniques leading to methods for diagnosing and curing their ineffectiveness;

- (2) the development of a prototype rule-based system which can remove from application programs the shared organisational knowledge which makes them difficult to maintain (this is the next major innovation in the spirit of database management that removed from the application programmer the responsibility for the shared data).

These two branches of the research would complement one another. The second would impose formal disciplines upon the opened exploration of the issues that give the whole exercise its central point - to make bureaucracy cost-effective.

Large administrations, both civil and military, in both the public and private sectors, have a reputation for bureaucratic inefficiency. To understand these systems is to have the potential means of removing their inefficiencies. This paper has indicated how their structures can be described in deontic terms and how their functioning can be analysed in terms of the effects of performatives. This strand of research would examine in detail some concrete examples in order to demonstrate how to recognise the over-all deontic structures they rely upon and to show how first to recognise and then critically to analyse their use of performatives. In this paper, it has been shown that such a study can help us to discover where the transaction costs are incurred; the research would generalise results of this kind and embody them in a methodology to support an on-going efficiency audit within any bureaucracy prone to the familiar defects of this kind of organisation.

The second branch of the research programme would centre upon the implementation of a Rule-base Management System to store a representation of the norms of an organisation quite separately from the application programs. For example, the expression:

if AGE > 25 then ...

would have the same arithmetical consequences in many application programs with totally different meanings. In every case, the meaning would belong to the category of business knowledge and its specific interpretation could be derived from one of the norms of which it forms a condition. The application programmer would not be expected to write such an expression but to retrieve it from the Rule-base. In one case it may refer to the age of a person, in another to the age in months of an engine component, and so on. The focus of the application programmer would be upon the transaction mix and intensity that would govern how best he should deploy computing resources to handle such rules. The construction of the Rule-base would be a task for the business analyst using a language which could build upon the earlier research of the authors', the languages CANDID and LEGOL. The proposed RBMS would separate the functions of business analysis and software engineering quite clearly and enable both to be done to a higher standard.

One of the main practical goals would be to simplify the maintenance of data-processing systems. The proposed method is to hold in one place the organisational knowledge that influences the shape of many application programs. Of course, the norms of a business will form a seamless fabric, so the changing of one norm cannot be made safely in isolation, but a representation of the norms as a separate and coherent body of organisational knowledge will enable the effects to be judged with reasonable precision. Today, the only formal representation of much of this knowledge

is with the application programs of a large system; change one, and the knock-on effects are hard to gauge. We can get rid of this needless complexity.

The two parts of the research would be indispensable to one another. There would be no point in developing a Rule-base Management System if there were no supporting methodology of business analysis; the study of actual deontic systems and their performatives by relatively informal methods would lead to the methodology. Similarly the possibility of carrying out a detailed, on-going audit of a large bureaucracy would be impaired if there existed no formal tool for modelling and analysing such complex structures. The RDBMS would be the right tool. The combined programme of research would generate a software product (in prototype form initially) and a methodology for using it.

The research suggested here would derive its inspiration from a paradigm unfamiliar to most people working with computers. It is socially orientated but such an orientation is surely the appropriate one for working on business applications. It gives us the opportunity to break new and difficult ground with a high chance of success warranted by earlier work done by the authors in this new field.

References

- Andersson, J.S. 1975. How to Define 'Performative', PhD Dissertation, University of Uppsala, Sweden.
- Angell, N. 1929. The Story of Money, Frederick A. Stokes, Co.
- Austin, J.L. 1962. How to Do Things with Words, University Press, Oxford.
- Bing, J. 1977. "Sistemi deontici: un tentativo introduzione", Informatica e diritto, Vol.4, No.2, pp.121-132.
- Bing, J. 1980. "Legal Norms, Discretionary Rules and Computer Programs", in Niblett, 1980.
- De Marco, T. 1979. Structured Analysis and System Specification, Prentice-Hall, Englewood Cliffs.
- Even, S., G. Oded, and A. Lempel, 1985. "A Randomised Protocol for Signing Contracts", Communications of the ACM, Vol.28, No.6 (June) pp.637-647.
- Flores, F. and J.J. Ludlow, 1980. "Doing and Speaking in the Office" in Fick, G. and R. Sprague (eds) Decision Support Systems: Issues and Challenges, Pergamon Press.
- Galbraith, J.K. 1975. Money: Whence It Came, Where It Went, Houghton Mifflin.
- Galbraith, J.R. 1973. Designing Complex Organisations, Addison-Wesley Publishing.
- Galbraith, J.R. 1977. Organisation Design, Addison-Wesley Publishing.
- Hilpinen, R. 1981a. (ed) Deontic Logic: Introductory and Systematic Readings, D. Reidel, Dordrecht.
- Hilpinen, R. 1981b. (ed) New Studies in Deontic Logic, D. Reidel, Dordrecht.
- Kimbrough, S.O., R.M. Lee and D.N. Ness, 1984. "Performative, Informative and Emotive Systems - The First Piece of the PIE", in L. Maggi, J.L. King, and K.L. Kraemer (eds) Proceedings of the Fifth International Conference on Information Systems
- Kimbrough, S.O. and R.M. Lee 1985. "On Telecommunications and Industrial Organisation", in P. Humphreys and R.M. Lee (eds) Knowledge Representation and Organisational Theory, to appear.
- Kuhn, T.S. 1962. The Structure of Scientific Revolutions, The University Press, Chicago.

- Leary, F. Jr. and D. Frisch, 1984. "Uniform Commercial Code Annual Survey: General Provisions, Sales, Bulk Transfers, and Documents of Title", The Business Lawyer, Vol.39 (August), pp.1851-1911.
- Lee, R.M. 1981. "CANDID Description of Commercial and Financial Concepts: A Formal Semantics Approach to Knowledge Representation" WP-81-162, International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Lee, R.M. 1984a. "Automating Red Tape: The Performative vs Informative Roles of Bureaucratic Documents", Offices: Technology and People, Vol.2, pp.187-194.
- Lee, R.M. 1984b. "Bureaucracies, Bureaucrats and Information Technology", European Journal of Operational Research, Vol. 18, pp.293-303.
- Lee, R.M. 1985. "Bureaucracy as Artificial Intelligence" in Methlie and Sprague 1985.
- Lee, R.M. and R.K. Stamper 1985. "Ontological Aspects of Logical Databases", Information Systems, Vol.10, No.3, pp.331-338.
- Lundeberg, M., G. Goldkuhl and A. Nilsson, 1981. Information Systems Development, Prentice-Hall, Englewood Cliffs.
- Lyytinen, K.J. "Theories of Language and Information Systems: An Appraisal of Alternative Language Views for Information Systems", MIS Quarterly, forthcoming.
- Methlie, L.B. and R.H. Sprague, 1985. Knowledge Representation for Decision Support Systems, North-Holland, Amsterdam.
- Mintzberg, H. 1973. The Nature of Managerial Work, Harper and Row.
- Morgan, E.V. 1965. A History of Money, Pelican Books, Harmondsworth.
- Niblett, B. 1980. Computer Science and Law, The University Press, Cambridge.
- Richardson, D.W. 1970. Electric Money: Evolution of an Electronic Funds Transfer System, MIT Press, Cambridge, Mass.
- Scherman, H. 1938. The Promises Men Live By, Random House.
- Searle, J.R. 1969. Speech Acts: An Essay in the Philosophy of Language, The University Press, Cambridge.
- Sesonske, A. 1965. "Performatives", Journal of Philosophy Vol.62.

Smith, A. 1776. The Wealth of Nations. edition 1973, Random House.

Stamper, R.K. 1973. Information in Business and Administrative Systems, Wiley, New York and Batsford, London.

Stamper, R.K. 1980. "LEGOL: Modelling Legal Rules by Computer", in Niblett 1980

Stamper, R.K. 1985a "Management Epistemology: Garbage In, Garbage Out" in Methlie and Sprague 1985.

Stamper, R.K. 1985b "A Logic of Social Norm for the Semantics of Business Information" in T.B. Steel and R. Meersmann (eds), Database Semantics, North Holland, Amsterdam.

Stamper, R.K. 1985c. "LEGOL Project Papers: An Annotated List of Papers Produced by the Project", Paper 10, The LEGOL/NORMA Project, London School of Economics.

Urmson, J.O. 1967. "Austin, John Langshaw" in P. Edwards (ed), The Encyclopedia of Philosophy, Vol.1, pp.221-215.

von Wright, G.H. 1968. "An Essay in Deontic Logic and the General Theory of Action", Acta Philosophica Fennica, Facs.XXI, North-Holland, Amsterdam.

Williamson, O.E. 1975. Markets and Hierarchies: Analysis and Antitrust Implications, The Free Press.

Williamson, O.E. 1979. "Transaction-Cost Economics: The Governance of Contractual Relations", The Journal of Law and Economics, Vol.22.